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On plates *b*, *d* and *e* two exposures were made, and each exposure reduced separately.

In the case of *c*, the comet itself was kept on the cross-wires, and the stars allowed to trail on the plate. In the other cases, the guiding was done by the aid of one of the comparison stars.

On each occasion the comet appeared sensibly circular, with slight condensation towards the centre.

In the computation of Log($p \times \Delta$) and Log($q \times \Delta$) the adopted value of Sun's mean horizontal parallax is 8″·80.

The meridian-circle observations of the comparison stars were made by Mr. Chas. Martin.

Adopted Places of Comparison Stars, as determined by observations with the Meridian Circle at Dunsink.

No.	B. D.	Mag.	Mean R.A. 1896·0.	Mean Decl. 1896·0.	No. of Obs.	
	°		h m s	° ′ ″		
1	+65, 214	9·5	1 49 2·96	+65 15 44·1	1	
2	+65, 216	8·6	1 50 7·23	+65 56 52·2	2	
3	+65, 218	9·4	1 53 22·11	+66 0 41·2	2	
4	+65, 219	9·5	1 53 47·78	+65 12 52·5	2	
5	+62, 369	7·0	2 8 7·14	+62 45 2·5	2	
6	+63, 319	9·3	2 11 49·52	+63 11 56·8	2	
7	+62, 379	9·0	2 12 40·83	+62 52 19·2	2	
8	+63, 327	8·6	2 15 35·77	+63 15 13·2	2	
9	+51, 678	8·8	3 0 1·08	+51 55 47·8	2	
10	+51, 680	9·4	3 0 29·83	+52 2 53·3	2	
11	+51, 683	9·0	3 1 37·09	+51 42 41·3	2	
12	+51, 686	9·1	3 2 55·03	+51 58 30·9	1	
13	+51, 689	7·3	3 4 13·03	+51 46 8·5	2	
14	+49, 871	8·3	3 4 49·76	+49 52 10·4	2	
15	+49, 873	9·2	3 5 46·24	+50 3 44·7	2	
16	+49, 877	8·7	3 6 41·04	+49 59 23·4	1	
17	+49, 885	9·0	3 8 9·13	+49 43 38·3	2	S.p. of two.

Dunsink Observatory, Co. Dublin:
1897 *May* 28.

Elements of Comet Perrine (f.) 1896 *November* 2.

By C. J. Merfield.

The following elements are based on observations taken by Mr. John Tebbutt, of Windsor, N.S.W., and kindly communicated to the writer some few days ago.

The selected places, after reducing the time to the meridian

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of Greenwich and correcting for aberration, also applying the parallax corrections to α and δ, are as follows :—

	t	α	δ
	d	h m s	° ′ ″
Mar.	5·24871	19 45 0·19	−31 31 58·78
	10·25059	19 42 47·56	−35 22 55·29
	15·24568	19 39 16·54	−39 59 8·32

Adopting the ecliptic as the fundamental plane, these places referred to the mean equinox of 1897 are

Day of year 1897.	λ	β
	° ′ ″	° ′ ″
63·24871	292 30 56·62	−10 6 37·82
68·25059	291 21 2·65	−13 48 56·77
73·24568	289 47 29·75	−18 13 26·36

In the computation the complete expression for the ratio M of the curtate distances for the first and third observations was employed, the radii vectores and anomalies of the comet for the three fundamental positions being derived from the elements by Dr. Knopf, published in the *Astronomische Nachrichten* 3394. The value of log. M thus derived being 9·9093881, this required no correction after the calculation was completed, the various checks being satisfied. The logarithm of the curtate distance for the first observation being 0·1404402.

These values gave the following system of parabolic elements :—

T = 1897 Feb. 8·168615 Greenwich M.T.

$$\left.\begin{aligned} \omega &= 172^\circ\ 25'\ 1''\!\cdot\!14 \\ \Omega &= 86\ \ 29\ \ 10\cdot82 \\ i &= 146\ \ 11\ \ 3\cdot78 \end{aligned}\right\}\text{M.E. 1897}$$

$\log q = 0\cdot0263786$

Middle place.

$c - o$

$\cos\beta'\Delta\lambda' = 6''\!\cdot\!7.$ $\Delta\beta' = 1'\cdot1.$

There is an error in the elements published in the *Astronomische Nachrichten* 3394, the longitude of the ascending node should read 86° 27′ 51″·1 instead of 86° 17′ 51″·1.

Sydney : 1897 *April* 10.

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The Expected Shower of Leonids in 1897. By W. F. Denning.

The return of the *Leonids* in November next, though it may fairly be expected to afford a pretty abundant display, will occur in the presence of a gibbous Moon and thus lose much of the conspicuous character which it may quite possibly have exhibited in a dark sky. At midnight following November 14 the Moon will be twenty days old and therefore nearing her last quarter (November 17, $2^h\ 2^m$), but her light will be sufficiently strong to overpower many of the smaller meteors and to moderate the apparent brilliancy of the larger ones.

In November we shall be placed fully two years before a maximum return is expected, and the density of that part of the stream so far in front of its associated comet is not likely to be considerable, but we may get a shower of perhaps fifty or sixty *Leonids* per hour for one observer on the night following November 14. It must be remembered that the radiant does not rise on that date until $10^h 15^m$ P.M. and passes the meridian at $6^h 30^m$ on the following morning. Observations are not, therefore, likely to be very productive until after midnight in consequence of the unfavourable position of the radiant.

In 1831 (two years preceding the great American shower of 1833) a French naval officer, Captain Berard, commanding the brig, *Le Loiret*, reported to M. Arago that "on November 13, at four in the morning, the sky being perfectly cloudless and a copious dew falling, he saw a number of shooting stars and luminous meteors of great dimensions. During upwards of three hours more than two per minute were seen." Dr. Wright, of Ohio, U.S.A., also witnessed an abundant fall of meteors on the same morning. In 1864 (two years before the fine European display of 1866) a star-shower of considerable strength was observed from the s.s. *Ellora*, off Malta, on the morning of November 13, for according to the report of those on board "there was a brilliant display of meteors all through the watch."

Seeing, therefore, that marked showers presented themselves in 1831 and 1864, we appear justified in expecting a tolerably active display in 1897. By a comparison of the observations made of the *Leonids* in 1895 and 1896 (*Monthly Notices*, lvi. 255, and lvii. 277), it will be noticed that a marked increase occurred in the latter year. A relatively far greater increase may be expected in the coming November, though the richest part of the stream will probably envelope the earth during daylight in England on November 14 and pass unseen.

From a comparison of the "brilliant showers" which occurred in the years 1865, 1866, 1867, and 1868, Mr. B. V. Marsh, of Philadelphia, U.S.A., concluded that there probably existed three concentric meteor-groups. "The densest or middle part of the meteoric dream through which the earth passed in 1866 (observed in Europe) and 1867 (observed in America)